National Aeronautics and Space Administration

LAGNIAPPE

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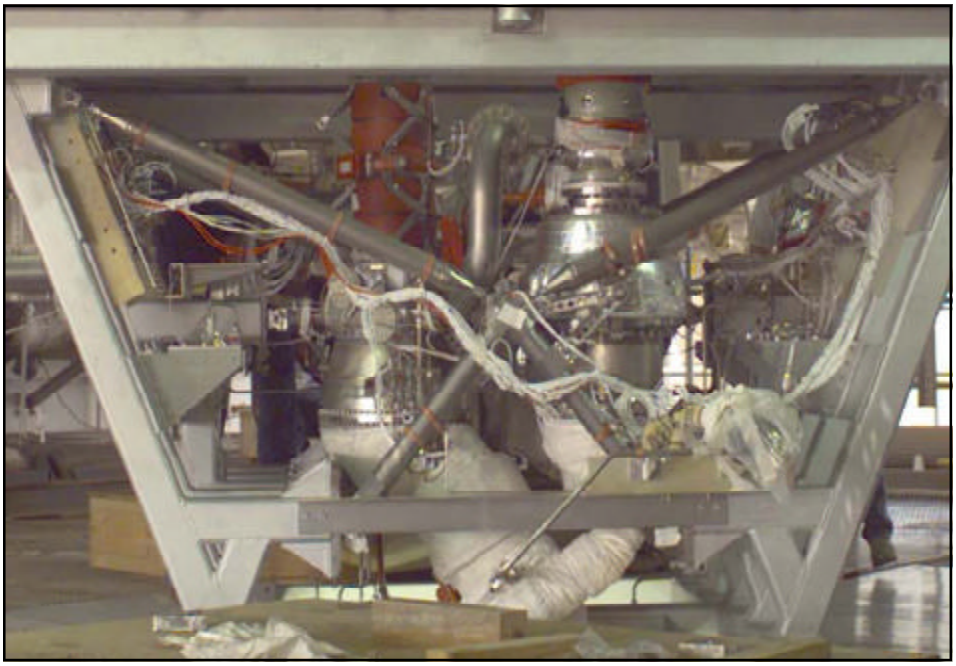

The power pack assembly, above, is a key component of the XRS-2200 Linear Aerospike Engine that will power the X-33. Stennis Space Center will begin conducting calibration tests by the end of the month in the A-1 stand. The power pack, though not a complete engine, contains the aerospike engine's main components, including turbopumps, a gas generator, vehicle connect lines and interconnecting flight ducts.

Stennis prepares for aerospike testing

Engineers are making last-minute adjustments to the linear aerospike's power pack assembly, which should undergo testing by the end of the month in the A-1 stand.

The power pack is a key component of the linear aerospike engines that will power the X-33, a half-scale prototype of NASA's Reusable Launch Vehicle program. The NASA-industry partnership is producing launch vehicles expected to dramatically cut the costs of putting payloads into orbit.

NASA's Steve Nunez, X-33 project manager at Stennis, said the test will entail running the power pack for 2.5 seconds to calibrate the liquid hydrogen and liquid oxygen fuel turbopumps and the test facility settings, as well as to verify valve timing to prime the gas generator.

The power pack, though not a complete engine, contains the main components, including turbopumps, a gas generator, vehicle connect lines and

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CFC kickoff held at Stennis Space Center

Each year, Stennis Space Center conducts a Combined Federal Agencies Campaign for the United Way. The 1998 campaign officially started on Sept. 8 in the Stennis Space Center Visitors Center auditorium.

Speakers included SSC Deputy Director Mark Craig; Dr. Herbert Eppert of the Naval Research Laboratory; Dave Geiger with Boeing/ Rocketdyne Propulsion and Power; Capt. Larry Warrenfeltz, commanding officer of NAVOCEANO and Southern Mississippi CFC coordinator; Terry Latham, director of Hope Haven; and Jack Ramsey with Harrison County Habitat for Humanity.

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Stennis Space Center Deputy Director Mark Craig, center, is escorted off stage by the New Orleans Brass' mascot Scratchmo, left, and the Mississippi Sea Wolves' mascot Hook, right, during the 1998 Combined Federal Campaign Kickoff. Stennis Space Center's goal for the 1998 drive is $150,000.

LAGNIAPPE **Commentary**
The Next 40 Years...

When NASA employees opened shop for business Oct. 1, 1958, the 170 employees of this new federal agency gathered in the courtyard of the Dolly Madison House in downtown Washington, D.C., to hear the newly appointed NASA Administrator, T. Keith Glennan, announce the bold prospects for space exploration. There was great expectation among those attending the briefing.

There was boldness in the planning of the activities of the new space agency. During the early years of NASA, as the Agency began to literally "reach for the stars," a true sense of commitment existed. Throughout NASA's history, a determination to succeed prevailed in much the same way it did during World War II when Americans mobilized to fight the enemies of freedom. In both cases, practically every man, woman and child rallied to preserve our freedom.

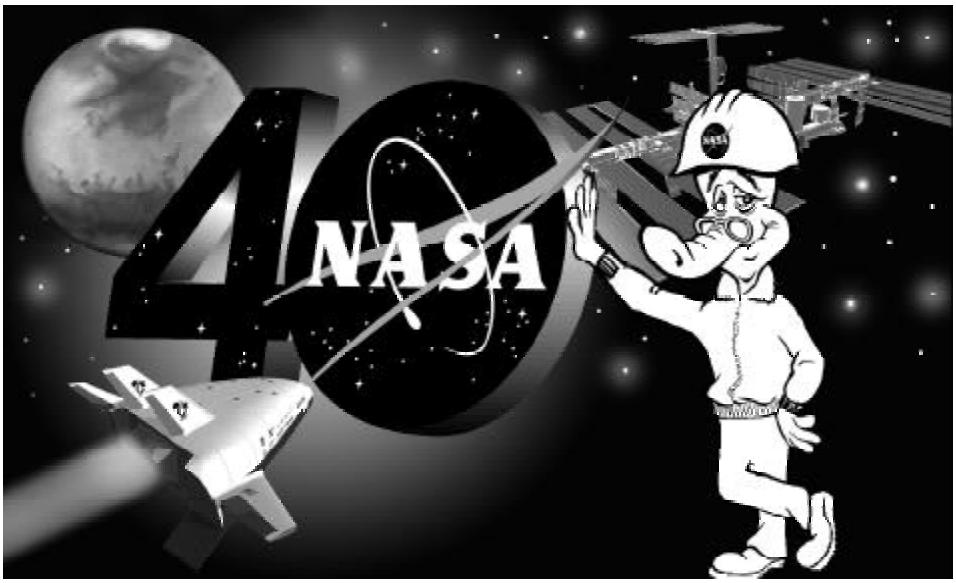
We here at Stennis Space Center have participated in the grand endeavor to explore space for the benefit of mankind since 1963. We built this rocket test center and tested the boosters that sent Americans to the moon and made space travel almost routine with the Space Shuttle. But even more important than these early achievements of the past is the work that is being done today in order to position the Agency for its work into the 21st century.

Our engineers, technicians, contract specialists, financial managers, scientists and other support personnel are not sitting back and waiting for the new millennium to arrive. Instead, they are working diligently to prepare Stennis Space Center and NASA for the future exploration and development of space. It is evident that all employees at Stennis Space Center are aiming toward one goal—that being the success of our center and the Agency as a whole. Yes, what has been learned during our first years, and what is being accomplished in these last days of the 20th century, will extend far into the new millennium.

If we could look into the future, we would likely see wonders taking place beyond anything imagined during the past 40 years of space exploration such as a permanent outpost in Earth's orbit, a voyage to Mars, a colony on the moon or a commercial expansion around the globe using the platform of space as the foundation.

These and other endeavors will come from what we know today. As Dr. Wernher von Braun used to say, "we can accomplish whatever we imagine." Many here at Stennis Space Center will be around to see what unfolds during the next 40 years. The rest of us can take great satisfaction in knowing that our legacy is left in good hands.

M.R.H.



NASA NEWSCLIPS

Goldin makes appointments—NASA Administrator Daniel Goldin has named Alan Ladwig Senior Advisor to the NASA Administrator, Edward Heffernan Associate Administrator for Legislative Affairs, and Lori Garver Acting Associate Administrator for Policy and Plans. These appointments became official in mid- to late August.

As senior advisor, Ladwig will serve as the primary catalyst for planning and communication of long-range initiatives. He also will continue to represent the Agency for media activities and public presentations and to coordinate Agency planning to commemorate NASA's 40th anniversary.

Heffernan has served as Acting Associate Administrator for Legislative Affairs since September 1997.

Garver has served as a senior policy analyst for the Office of Policy and Plans since 1997.

Stephenson named Marshall director—Arthur Stephenson, president of Oceaneering Advanced Technologies, Houston, Texas, has been named to become the next director of NASA's Marshall Space Flight Center, Huntsville, Ala.

Stephenson has over 30 years' experience as a manager in spacecraft and high technology systems.

NASA Administrator Dan Goldin said that Marshall Deputy Director Carolyn Griner would assist in the transition and thanked her for serving as acting center director.

Since 1992, Stephenson has been a senior official with Oceaneering International. Prior to that, he worked for TRW, Redondo Beach, Calif., for 28 years and last served there as director, Space Transportation and Servicing Advanced Programs.

New computer chip mimics human brain—A new computer chip that mimics how the human mind works is making its way from the space program to American industry and may end up in millions of American cars in years to come.

NASA's Jet Propulsion Laboratory , Pasadena, Calif., and the Ford Motor Co. have signed a licensing agreement for use of an advanced neural network technology to diagnose misfiring under the hoods of Ford automobiles, among its many potential uses. With the advent of this new chip, vehicles should show a reduction in emission levels.

Cottrell

NASA's Cottrell chosen Woman of the Year

Dinna Cottrell was honored at a Women's Equality Day Luncheon sponsored by the Sitewide Federal Women's Program and Government Contractors and held recently at the Waveland, Miss., Holiday Inn.

Cottrell was named SSC Woman of the Year. The event is sponsored by the NASA Federal Women's Program Advisory Council.

Cottrell, a computer systems engineer in the Information Management Division of the Center Operations and Support Directorate at Stennis Space Center, received the award in the Professional Administrative and Science and Engineering category.

Among her greatest achievements included receiving a Hammer Award from the White House National Performance Review Office for her computer support efforts in support of the establishment of the Tri-State Education Initiative.

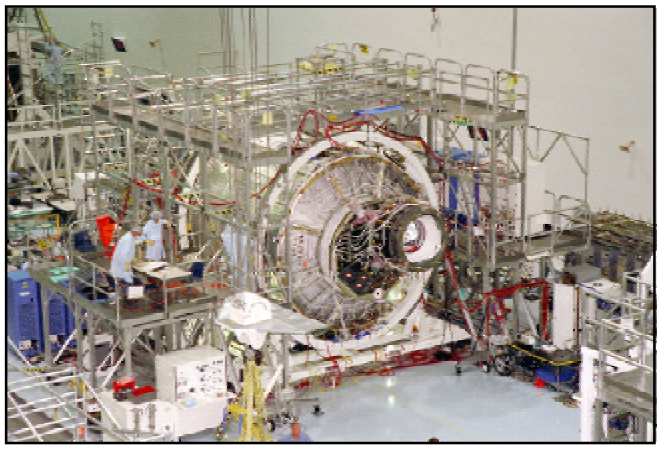
Cottrell has also been recognized for her exceptional job performance that included serving as a student mentor during the summers of 1993-1997, one summer of which she mentored four students.

Cottrell has served as an Equal Employment Opportunity Counselor since 1992. She is currently a member of the Association for Cultural Awareness and served as the association's president for two years. She is also very active in the Slidell Alumnae Chapter of Delta Sigma Theta Sorority Inc., where she has conducted mathematics and computer workshops for various sorority public service activities.

She has been employed with NASA since 1986.

NASA accepts the "keys" to Unity

The Unity connecting module, the first U.S.-built component of the International Space Station, moved a step closer to orbit when Boeing, the manufacturer of Unity, officially handed over the module's "keys" to NASA.



The Unity connecting module, a component of the International Space Station, awaits further processing at Kennedy Space Center in Florida.

NASA officially accepted the module after review and certification of construction by NASA and Boeing station managers at NASA's Kennedy Space Center, Fla. The module is scheduled for launch aboard Space Shuttle Endeavour on the STS-88 mission on Dec. 3. It will be launched two weeks after the first station component, the U.S.-funded, Russian-built Zarya module, from the Baikonur Cosmodrome in Kazakstan. Unity will be mated to Zarya by Endeavour's astronauts to begin the five-year orbital assembly of the International Space Station.

The module is a critical component of the station, a six-sided connector with a berthing port on each side. Along with Unity at Kennedy, more than a half-dozen major pieces of U.S. and foreign-built hardware are now being prepared for launch.

Unity was manufactured by Boeing at NASA's Marshall Space Flight Center in Huntsville, Ala. It was transported from Alabama to Florida in June 1997, where final assembly and launch preparations began.

Projects could lead to new technologies

The Commercial Remote Sensing Program Office at Stennis has selected 10 projects that could lead to new commercial uses of advanced sensors. The projects are being developed through the Earth Observations Commercial Applications Program-Hyperspectral (EOCAP-Hyperspectral).

The program is designed to increase the use of NASA technology for gathering and analyzing information about the Earth through sensors mounted on aircraft or satellites. EOCAP-Hyperspectral will define the technology gaps that prohibit or impede the use of hyperspectral data and recommend solutions for filling those gaps.

"This is the type partnership between NASA and value-added industry that the NASA Earth Science program is forging. We want to emphasize investments of NASA-sponsored technologies to demonstrate benefits of our program toward solving practical societal problems while promoting a healthy commercial remote sensing industry in the U.S.," said Dr. Ghassem Asrar, Associate Administrator for Earth Sciences, NASA Headquarters in Washington, D.C.

EOCAP-Hyperspectral is managed by the Commercial Remote Sensing Program Office at Stennis. Its role in commercial activities is to provide financial and technical support to companies for two to three years in areas of remote sensing activities where there is substantial market risk in matching science and technology with commercial demand.

The projects support technical, market and business innovation to develop new products or services that serve emerging domestic and international markets. Selected proposals, in addition to high technical competence, typically exhibit the following traits: strong business and marketing plans; product advisory boards to guide the product and/or service development; and substantial financial commitments to the projects by the companies.

The recipients of the 1998 EOCAP-Hyperspectral project awards are: Eastman Kodak, Rochester, N.Y.; United States Department of Agriculture, Beltsville, Md.; Yellowstone Ecosystem Studies, Bozeman, Mont.; Applied Analysis, Billerica, Mass.; Cal State-Monterey Bay, Seaside, Calif.; Boeing Information, Space & Defense Systems, Seattle, Wash.; GDE Systems Inc., San Diego, Calif.; MTL Systems Inc., Beavercreek, Ohio; Opto Knowledge Systems Inc., Torrance, Calif.; and Spectral International, Arvada, Colo.

Hydrogen peroxide engine to be tested

In addition to shuttle main engine testing and upcoming testing of X-33 and X-34 propulsion systems, Stennis is finalizing plans to test a new rocket engine for a commercial customer who is contracted to the U.S. Air Force.

NASA, the Air Force, Orbital Sciences Corp. (OSC) of Chandler, Ariz., and OSC's propulsion subcontractor, Kaiser Marquardt of Van Nuys, Calif., are working together to test a 10,000-pound-thrust, restartable engine that will use kerosene fuel and highly concentrated hydrogen peroxide (oxidizer).

NASA's Robert Bruce, Test Projects Office chief, said testing should begin in the second half of October at the E-3 test facility and continue through December.

"We're excited and enthusiastic about this opportunity to work with Orbital Sciences on this project for several reasons," Bruce said.

"Working with highly concentrated H_2O_2 is a new challenge for our Stennis team, one we take very seriously. When we complete our training and other preparations for this test series, we'll be confident we've developed a safe and efficient process for testing with this new product and this new test article."

The engine is part of the Upper Stage Flight Experiment, jointly funded by NASA and the Air Force. The goal is to develop a nontoxic upper stage for the Air Force's military spaceplane called the Space Operations Vehicle (SOV) or for a future NASA Reusable Launch Vehicle.

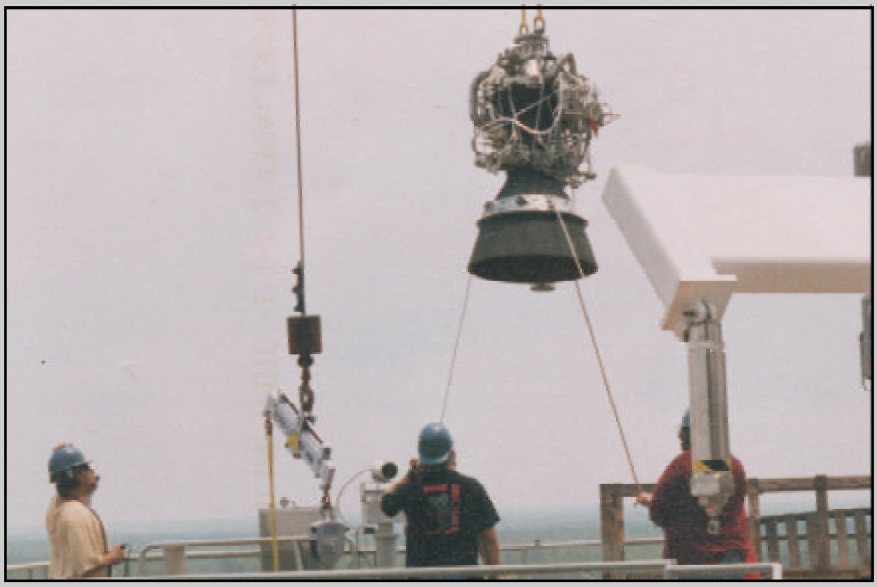
The SOV will be a relatively low cost, reusable spacelift vehicle with aircraft-like operations. Two subsystems of the SOV are the Space Maneuver Vehicle and the Modular Insertion Stage.

The Space Maneuver Vehicle will be a reusable upper stage that can be left in space for a year and can return to Earth using an autonomous re-entry and landing system.

The Modular Insertion Stage is an expendable upper stage that will increase the SOV's capability for deploying payloads. The upper stage will burn up upon re-entry.

Because the subsystems are required to be stored and fully fueled for one year, their propulsion systems must be restartable, nontoxic and storable. Hydrogen peroxide is being used to meet the requirements of the two subsystems. This fuel also eliminates ground and flight operations needed for handling cryogenic oxidizers such as liquid oxygen.

The engine slated for testing will be a first-generation propulsion system for the SOV upper stage. Further plans are to develop a higher performing, lighter weight, peroxide-based propulsion system.



Technicians at SSC lower the Fastrac 60K engine into the B-2 stand where it will be tested in the horizontal position. Testing is scheduled to begin in October.

New Fastrac engine testing to begin soon

Stennis test engineers are dusting off the previously dormant second position of the B test stand to hot fire test one of the newest rocket engines developed in the United States in 25 years.

The first test of the Fastrac engine is scheduled for Oct. 20. Upon completion of development and flight certification tests in 1999, the 60,000-pound-thrust engine will power the new, unpiloted X-34 technology demonstrator.

Not only will the October test mark the beginning of a new propulsion test program at Stennis, it will also be the first test in the B-2 test position in 15 years.

The B-2 was used to test the first stage of the Saturn V moon rocket during the Apollo program. It was modified in the late 1970s and early 1980s to test the Space Shuttle's Main Propulsion Test Article, which included the shuttle external tank and the three-engine cluster of Space Shuttle Main Engines. The B-2 position has been inactive since.

Stennis Space Center's role in testing the new engine for the X-34 is part of the Low Cost Technologies project—a joint effort between the Marshall Space Flight Center in Huntsville, Ala., and Stennis.

Through the program, NASA is attempting to dramatically lower the cost of launching small payloads, up to 500 pounds, into low-Earth orbit.

Low cost access to space is considered a key to scientific progress and commercial economic development of space.

At Stennis, Richard King is the project manager and Dr. Don Chenevert is the lead project engineer for the Low Cost Technologies program. John Stealey is the B-2 test director.

The Fastrac engine is installed horizontally on the outer edge of the test stand's 11th level. During the test, the engine's exhaust plume will shoot outward rather than vertically into the water-cooled flame deflector.

The Fastrac is unique in many ways. It is an inexpensive, government-furnished engine developed at Marshall. It is fueled by a mixture of kerosene and liquid oxygen and uses a gas generator to drive a single-shaft turbopump.

Each Fastrac engine will initially cost approximately $1.2 million—about one-fifth the cost of similar engines. Once the engine is in mass production, the cost is expected to drop to about $750,000.

Producing the engine is simple because it contains fewer parts than

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A section of the Krusne Hory forest in the northern Czech Republic, above, showing many heavily damaged trees. Acid rain, caused by pollution, turned the soil acidic and it doesn't support life very well. NASA's Dr. Richard Miller, right, uses a spectroradiometer to measure the reflectance of light from a hillside to calibrate airborne sensors that will fly over the area.

Miller travels to Czech Republic to study forest recovery and revitalization project

A scientist with the Earth System Science Office at Stennis Space Center recently returned from a two-week trip to the Czech Republic where he helped assess recovery and revitalization efforts of one of the country's major forests.

Dr. Richard Miller, chief of NASA's Earth System Science Office at Stennis, traveled to the Krusne Hory forest in the northern Czech Republic.

"It's part of a project funded by NASA Headquarters to determine whether or not the trees of the Krusne Hory forest are recovering from damage caused by pollution," he said.

The pollution has come from many different sources, particularly since the industrial revolution in Europe with the burning of coal and wood. This has caused excessive air pollution, which in turn has resulted in acid rain which turns the soil acidic so that it doesn't support plant life very well.

"A number of the forests in several of the countries in Europe have incredible diebacks," Miller said. "In 1989, the Czech Republic initiated a rather aggressive program of liming the forest from helicopters."

The purpose of spreading lime throughout the forest is to neutralize the acidity of the soil. According to Miller, Czech Republic officials believe that the liming program has helped the forest start on the path to recovery.

The project, currently in its second year, is a three-year collaborative effort involving Miller, NASA's Dr. Greg Carter of the Earth System Science Office and Dr. Barry Rock of the University of New Hampshire. Rock had been studying the forests of Europe for many years and was in the Czech Republic in the early 1990s when he first saw evidence that perhaps the forest was responding to efforts to neutralize the acid.

Rock, Miller and Carter submitted a proposal to NASA for monitoring the recovery of the Krusne Hory.

"A key element of this is remote sensing," Miller said. "The purpose was to try not only to see if some trees were recovering, but to map the spatial extent of the recovery. This is a collaborative project between NASA at Stennis, the University of New Hampshire, NASA at Goddard and investigators from the Czech Republic at Charles University."

Stennis Space Center's contribution to the project, in addition to Earth science expertise, was the use of a technique and device recently developed at Stennis by Carter and NASA's Bruce Spiering, also of the Earth System Science Office, to detect plant stress before it becomes visible to the human eye.

Carter has found that at certain wavelengths of light, a small amount of chlorophyll loss causes an appreciable increase in light reflection from leaves.

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Two tech transfer proposals will focus on propulsion

Two research proposals selected for NASA's 1998 Small Business Technology Transfer Program will focus on propulsion research at Stennis Space Center.

In August, NASA selected 25 proposals from small businesses across the nation for negotiation of contract awards in Phase I of the technology transfer program.

Proposals by Imlach Consulting Engineering of Anchorage, Ala., and Laser Diagnostics LLC of Santa Fe, N.M., were among the 25 chosen.

Imlach Consulting Engineering's proposal will focus on a high accuracy modular thrust measurement system utilizing magnetic bearings.

Laser Diagnostics' research will look into hydrocarbon-fueled rocket engine health monitoring by laser-induced breakdown spectroscopy.

The Small Business Technology Transfer Program is designed to stimulate technological innovation. It also helps small businesses become better qualified to assist NASA in its research and development, and increase private commercialization of federally funded research.

The program also requires small businesses to conduct cooperative research and development by partnering with a research institution.

Stennis and six other NASA centers reviewed the proposals for technical merit, feasibility and relevance to NASA research and technology requirements.

The selected firms will be awarded fixed-price contracts valued at up to $100,000 each to perform a one-year Phase I feasibility study.

The combined award total for the 25 Phase I contracts is expected to be $2,495,046. Companies that successfully complete the Phase I activities are eligible to compete for Phase II selection the following year. The Phase II award allows for a two-year, fixed-price contract up to $500,000.

The 1998 solicitation closed on May 14. NASA received 130 proposals submitted by small, high technology businesses from across the country.

Phase I awards were made to companies in Alaska, Alabama, California, Colorado, Florida, Iowa, Massachusetts, Maryland, Missouri, Montana, New Mexico, New York, Pennsylvania, Virginia and Washington.

Dr. David Powe, NASA chief of Education and University Affairs at Stennis, welcomes members of the Atlanta Public Schools Urban Systemic Initiative to the Mississippi Interactive Video Network site at Stennis Space Center. The group, which includes representatives from Atlanta Public Schools, Georgia Institute of Technology-CEISMC and Clark-Atlanta University, visited Stennis to use the electronic strategic planning software to develop procedures to implement its strategic plan. The goal of the initiative is to help children in the Atlanta area become better achievers in math and science.

New remote sensing work force initiative designed to train students for the future

Stennis Space Center has launched the Commercial Remote Sensing Workforce Development Education and Training Initiative (WDETI). Its purpose is to establish a trained work force that will ensure Mississippi's ability to remain competitive in the growing remote sensing job market.

Remote sensing, the acquisition and interpretation of data from a distance above the Earth, is a rapidly growing, high-tech industry that is emerging worldwide.

The goal of the initiative is to establish world-class remote sensing education and research centers in Mississippi that will address the critical shortage of trained personnel in the area of remote sensing.

"One of the most exciting things about this program is that it is utilizing the existing infrastructure (education and industry) to create systemic change. At the same time, it is delivering education and training designed to meet the needs of the remote sensing industry as it develops initially in Mississippi and later nationwide," Dr. George Leggett, director of the Workforce Development Education and Training Initiative, said.

The work force initiative is part of the Mississippi Space Commerce Initiative, a collaboration among the state of Mississippi, NASA, private space-related businesses and four research universities.

Stennis Space Center, Mississippi State University, Jackson State University, the University of Mississippi Medical Center and the University of Southern Mississippi will serve as Centers of Excellence for Geospatial Studies. Stennis will also offer virtual campus activities.

These four universities will establish and support research assistantships and work-study programs, which will require students seeking remote sensing-related degrees to spend several months working at Stennis with the Commercial Remote Sensing Program or the Mississippi Space Commerce Initiative Research Institute. The time spent working at Stennis will provide students with both research and work experience in the remote sensing field.

Although remotely sensed data is most widely known for being used to make accurate maps of the Earth's surface, the University of Mississippi Medical Center is currently working with Stennis Space Center in developing new uses for remote sensing technology in the field of medical imaging. Remote sensing will be invaluable in making a more precise diagnosis or in guiding treatment.

One of the first projects being discussed is the manipulation of body images from a computed tomography (CT) or magnetic resonance imaging (MRI), which will allow physicians to see the image in three dimensions. Currently,

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interconnecting flight ducts.

Stennis will test the power pack before testing a fully assembled engine. Two aerospike engines will power the X-33, which will be a test vehicle only.

The X-33 engine program marks the newest propulsion test program at Stennis in more than two decades. Since 1975, Stennis Space Center's main role has been Space Shuttle Main Engine testing.

"Our engineers and technicians are excited because it's new hardware, and they get to be part of a new program that will take us into the next century," Nunez said.

NASA says the X-33's aerospike engine is superior to today's rocket engines because it is lighter, smaller and more fuel efficient, using a combination of liquid hydrogen and liquid oxygen.

Boeing/Rocketdyne Propulsion and Power in Canoga Park, Calif., produces the aerospike engine.

"We will have four power pack assembly configurations and plan to perform a total of 18 tests," Nunez said.

The test preparations have required extensive coordination and teamwork between NASA and its main contractors Boeing/Rocketdyne Propulsion and Power, Lockheed Martin Stennis Operations and Johnson Controls World Services Inc.

Lockheed Martin Skunk Works in Palmdale, Calif., is building the X-33. Test flights will begin next year.

Matherly, Information Management Division get the word out

Stennis Space Center is more than a place that tests rocket propulsion systems for the nation's space program. It's also a unique federal city, complete with an infrastructure to support the employees of NASA and the more than 30 resident agencies that take advantage of the cost savings of sharing facilities and services.

One part of that infrastructure is information. In particular, how it is used, communicated and shared. Dana Matherly is NASA's chief of the Information Management Division within the Center Operations and Support Directorate and the chief information officer at Stennis.

As chief of the Information Management Division, Matherly is responsible for the planning, policy-making and operations for the information technology applications at the center. Information technology applications include desktop computers, the center's computer network, as well as the telephone, radio communication, television cable, and Internet systems that keep everyone at Stennis connected and informed.

"In short, we keep that infrastructure operating and available so that the program offices and the other resident agencies at the center can do their jobs," Matherly explained. "What we do in center operations is basically run the city of Stennis."

As chief information officer, Matherly's job also requires him to develop and implement NASA policy at Stennis for all information technology and information management. This includes setting the standards for computers, software and hardware, and information security that the people of Stennis depend upon to do their jobs.

"It's truly exciting to make the government's capabilities relevant and available to the public.

Dana Matherly

"We also make sure we can communicate easily from center to center within NASA and on-site with the resident agencies as well as with the general public."

Originally from Burkburnett, Texas, Matherly earned a bachelor's degree in mechanical engineering from the University of Texas at Arlington in the early 1970s. He then graduated from Texas A&M in the mid-1970s with a master's degree in industrial engineering.

Matherly first came to Stennis Space Center in 1976 to work as the project manager to build the Mississippi Army Ammunition Plant. When the plant began operations in 1982, he chose to stay in the area and work as an engineer at the plant.

SSC Employee Profile

With the deactivation of the Mississippi Army Ammunition Plant in 1990, Matherly came to work for NASA at Stennis as a technical manager working in center operations, overseeing the management of the many laboratories at the center.

Matherly's rise to his present position was a process of evolution from one challenging project to another, until he became the chief information officer for Stennis in 1996.

"It was an evolutionary thing from the technical laboratories into the business and financial world, into the planning and integration of contract requirements with the other agencies and the NASA programs into information systems," Matherly said.

Matherly said he enjoys the challenges as Stennis Space Center evolves from a traditional government institution, growing new partnerships with high-tech business and industry.

"We are moving into an era where business and industry are locating at Stennis," Matherly said.

"It's truly exciting to make the government's capabilities relevant and available to the public. It will bring growth to the area," he said.

Fortieth Anniversary
Pioneering the Future

Editor's note: As part of Stennis Space Center's celebration of the 40th anniversary of the National Aeronautics and Space Administration, the *Lagniappe* will publish monthly throughout 1998 significant dates in NASA's history.

Feb. 3-11, 1995—Exactly one year after a cooperative flight with the Russians on STS-60, Discovery flew by the Russian space station Mir under the control of the first woman pilot, Eileen Collins.

June 27-July 7, 1995—First shuttle/Mir docking mission completed.

March 22-31, 1996—United States astronaut Shannon Lucid became the first U.S. woman to fly on the Mir space station. This marked the beginning of her five-month stay aboard the spacecraft.

May 30, 1996—NASA designates SSC as lead center to manage capabilities and assets for rocket propulsion testing.

July 2, 1996—NASA announces that SSC will conduct engine component testing for the X-33 for the Reusable Launch Vehicle program.

Feb. 21, 1997—SSC designated NASA's lead center for implementing commercial remote sensing activities.

July 4, 1997—The Mars Pathfinder landed on Mars, after its launch in December 1996. It recorded weather patterns, atmospheric opacity and the chemical composition of rocks.

Jan. 22, 1998—The Endeavour (STS-89) was the first Space Shuttle to fly with three Block IIA SSMEs tested at SSC.

July 27, 1998—Activation initiated of E-1 Component Test Facility, world-class high-pressure component cryogenic facility at Stennis.

Aug. 8, 1998—All four major test positions at Stennis occupied for the first time in the center's history.

More than 30 representatives of the New Iberia, La., Chamber of Commerce recently visited Stennis Space Center. During their day-long visit, the group, made up of community leaders, business people and members of the city council, received updates from members of the Commercial Remote Sensing Program Office and the Technology Transfer Program at Stennis. Pictured left, chamber members are given an overview of the Louisiana Technology Transfer Office's programs and capabilities by Andy Bush, right, outreach coordinator for the office.

Spacecraft selected for exploration

Small spacecraft to study the vast region between our Sun and nearby stars and the interaction of Earth's radiation belts with the solar wind have been selected as the first missions in NASA's University-class Explorers program.

The second mission, the Inner Magnetosphere Explorer (IMEX), will study the response of Earth's Van Allen radiation belts to variations in the solar wind. The energetic charged particles (mainly protons and electrons) that comprise Earth's radiation belts are potentially hazardous to both astronauts and satellite systems. IMEX will be launched into a 217-mile by 21,748-mile elliptical orbit around Earth with instruments to measure the populations of energetic particles and related magnetic and electric fields throughout Earth's radiation belts on a regular basis.

Chairman and Chief Executive Officer of Hancock Bank, Leo Seal, center, views a Space Shuttle Main Engine test on the A-2 test stand along with Stennis Space Center Director Roy Estess, right, and Ed Hilliard, left, senior vice president of Hancock Bank. Seal, along with other members of Hancock Holding Company's board of directors, visited the center to receive a briefing on Stennis activities.

INITIATIVE...

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NASA has the software to make this possible. Also, scientists are investigating the remote sensing of vital signs. Heart rate, pulse, blood pressure and temperature would be available in split seconds after a sensor is aimed at the patient.

Several of Mississippi's community colleges are also being used as prototype training and education centers. These centers, in addition to providing the necessary resources for remote sensing training, will be locations where citizens, industry and government agencies can access the information and knowledge available through the use of space technology.

The community colleges are also part of a new program that will establish application centers at each community college campus to provide industry training in remote sensing for its district.

Recently, the Mississippi Department of Education and WDETI initiated a pilot program to introduce remote sensing education in Mississippi schools from kindergarten to college. The program, currently located in six secondary schools and six community colleges, is using the existing infrastructure and educational delivery system to make this implementation a seamless process.

When fully implemented, this program will place remote sensing training within reach of all Mississippi students by the year 2002.

The SSC Wellness Center recently opened its new lap/exercise pool. Pictured from left are Scott Burks, director of the SSC Wellness Center; Capt. Larry Warrenfeltz, commanding officer of NAVOCEANO; Capt. Dave Mogan of the National Data Buoy Center (NDBC); Special Assistant to the NASA Center Director Jon Roth; and Ed Gobert, NASA's head architect at Stennis. NAVOCEANO and NDBC, longtime advocates of a lap/exercise pool to supplement their exercise and training requirements, co-funded the building of the pool that all SSC employees can use. The pool is open from 6 a.m. to 6:45 p.m. Monday through Friday. It holds 50,000 gallons of water, has three lanes that are four feet deep, 25 yards long.

NASA discovers how rings were formed

Jupiter's intricate, swirling ring system is formed by dust kicked up as interplanetary meteoroids smash into the giant planet's four small inner moons, according to scientists studying data from NASA's Galileo spacecraft. Images sent by Galileo also reveal that the outermost ring is actually two rings, one embedded within the other.

The findings were announced by scientists from Cornell University, Ithaca, N.Y., and the National Optical Astronomy Observatories, Tucson, Ariz., at a news briefing held at Cornell.

In the late 1970s, NASA's two Voyager spacecraft first revealed the structure of Jupiter's rings: a flattened main ring and an inner, cloud-like ring, called the halo, both composed of small, dark particles. One Voyager image seemed to indicate a third, faint outer ring. New Galileo data reveal that this third ring, known as the gossamer ring because of its transparency, consists of two rings. One is embedded within the other, and both are composed of microscopic debris from two small moons, Amalthea and Thebe.

Galileo took three dozen images of the rings and small moons during three orbits of Jupiter in 1996 and 1997. The four moons display bizarre surfaces of undetermined composition that appear very dark, red and heavily cratered from meteoroid impacts. The rings contain very tiny particles resembling dark, reddish soot. Unlike Saturn's rings, there are no signs of ice in Jupiter's rings.

Scientists believe that dust is kicked off the small moons when they are struck by interplanetary meteoroids, or fragments of comets and asteroids, at speeds greatly magnified by Jupiter's huge gravitational field, like the cloud of chalk dust that rises when two erasers are banged together. The small moons are particularly vulnerable targets because of their relative closeness to the giant planet. As dust particles are blasted off the moons, they enter orbits.

Wingspan End-to-End Width: 356.4 feet (108.6 meters)

Length: 290 feet (79.9 meters)

Mass (Weight): 1,005,000 pounds (455,865 kilograms)

Operating Altitude: 220 nautical miles average (407 kilometers)

Inclination: 51.6 degrees to the Equator

Atmosphere: 14.7 pounds per square inch (101.36 kilopascals) same as Earth

Crew: up to 7 people at assembly complete

Examples of the types of U.S. experiments that will be performed aboard the International Space Station (ISS) will include:

Protein crystal studies: More pure protein crystals will be grown in space than on Earth. Analysis of these crystals helps us better understand the nature of proteins, enzymes and viruses, leading to the development of new drugs and a better understanding of the fundamental building blocks of life. Similar experiments have been conducted on the Space Shuttle, although they are limited by the short duration of shuttle flights. The ISS experiments will lead to the study of possible treatments for cancer, diabetes, emphysema and immune system disorders, among other research. This research is an example of studies in the discipline of biotechnology.

Tissue culture: Living cells are grown in a laboratory environment in space where they are not distorted by gravity. NASA already has developed a device that is used on Earth to simulate, for such cultures, the effect of reduced gravity. Still, these devices are limited by gravity. Growing cultures for long periods aboard the ISS will further advance this research. Cultures will be used to test new treatments for cancer without risking harm to patients. This research is also in the field of biotechnology.

CFC...

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Featured speaker for the event, Randy Bourgeois, an employee of Boeing/ Rocketdyne Propulsion and Power at Stennis, related how the United Way is touching and affecting his life.

Bourgeois' young daughter was recently diagnosed with Fanconi anemia, a rare form of anemia that is currently incurable and leads to bone marrow failure. Patients with Fanconi anemia are more likely to develop acute leukemia and other forms of cancer.

Hope was given to his family in the form of the Fanconi Anemia Research Fund, a tax-exempt, nonprofit organization dedicated to providing education, support services and finding treatments and a cure for Fanconi anemia.

"Many promising experiments such as gene therapy, improved bone marrow transplant procedures and experimental drug therapy trials are funded solely through the work of this organization," Bourgeois said.

He also pointed out that for many children with Fanconi anemia, the future of research is their only medical hope, "Hope is equal to dollars," he said.

The goal for this year's Combined Federal Campaign at Stennis is $150,000.

Craig said the Combined Federal Campaign is a good way for SSC employees to help people in the area. "It's a wonderful chance for us to do something right here at home for our friends and neighbors," he said.

QUICK LOOK

■ **In observance of NASA's 40th anniversary all NASA and contractor employees** are invited to a barbecue to be held 4 p.m. Thursday, Oct. 1 at the Visitors Center. Two astronauts will be in attendance to visit with Stennis employees.

■ **The SSC Fall Family Picnic** will be held from 10 a.m.-6p.m. Saturday, Oct. 17 at McLeod State Park. Please plan to attend. There will be fun, food and games, and other special activities are planned for the entire family.

■ **The Stennis Space Center Health Clinic** has released its flu vaccination schedule.

Friday, Sept. 25—8:30-11:30 a.m. and 1:30-4 p.m.

Thursday, Oct. 1—1:30-4 p.m.

Friday, Oct. 2—8:30-11:30 a.m. and 1:30-4 p.m.

Thursday, Oct. 8—1:30-4 p.m.

Friday, Oct. 9—8:30-11:30 a.m. and 1:30-4 p.m.

Thursday, Oct. 15—10:30 a.m.-noon and 2-4 p.m.

Friday, Oct. 16—10:30 a.m.-noon and 2-4 p.m.

CZECH...

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His research has shown that the proper instrumentation can detect this increased reflection up to two weeks before it becomes visible. Spiering has developed a device that uses Carter's methods in the field and displays the relative amount of chlorophyll on a video monitor.

Miller took a prototype of the portable plant stress imager with him to the Czech Republic to assist in determining forest health conditions.

"We think that maybe the forest is recovering, and one of the best tools we could use is to relate remotely sensed data to ground physiological measurements. An exciting component of this is the approach that Dr. Carter has established," Miller said.

FASTRAC...

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other American rocket engines. An example is its three-piece injector, which is a sharp contrast from typical injectors that have hundreds of pieces.

Development time has also been a factor. While developing a new rocket engine has traditionally taken as long as 10 years, the Fastrac was developed in less than three years.

Another unique point is that NASA simplified the engine design and avoided the expense of highly specialized, labor-intensive manufacturing processes. This enabled small companies that have not traditionally been associated with the aerospace industry to build the hardware.

LAGNIAPPE

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EDITOR:.....Sharon Saucier

CONTRIBUTING WRITERS:
Robert Collins.....Kelly Smith
.....Courtney Thomas

PHOTOGRAPHERS:
.....Charles Jones

National Aeronautics and Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529

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